<u>IN THE CLAIMS</u>

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.   (Currently amended)   <u>A computer-implemented method</u> ~~Method~~ for determining the spatial position of wheel rim to a measuring unit, that includes at least one camera, wherein the wheel rim lies in the viewing field of the camera, <u>the method</u> comprising ~~including~~:

making available of a model that describes a model body of a localizable wheel rim geometry detail as well as the spatial position of the model body to the measuring unit through model parameters,

capturing of a picture of the wheel rim geometry detail of the wheel rim with the camera,

fitting<u>, by the computer,</u> of the picture of the model body resulting from the model parameters to the picture of the rim geometry detail through changing the model parameters of the model, and

tracking<u>, by the computer,</u> the changes of the model parameters of the model upon the fitting, ~~whereby~~ <u>wherein</u> the data related to the position of the model body of the wheel rim geometry detail reflect the spatial position of the wheel rim geometry detail and, thereby, of the wheel rim itself, when the image resulting from the model parameters of the model body of the wheel rim geometry detail matches to the captured picture of the wheel rim geometry detail within the asserted tolerance limits.

2.   (Currently amended)   The method ~~Method~~ according to claim 1, ~~characterized thereby that~~ wherein the model body is a so-called osculating torus or a 3D-CAD representation.

3.   (Currently amended)   The method ~~Method~~ according to claim 2, wherein ~~characterized in that~~, in case of the osculating torus, model parameters of the model are a primary radius R and a secondary radius r of the torus, a position c of the torus center, a normal vector n of the plane of rotation of the torus and a position z of the projection center of an aperture camera, with which the osculating torus is viewed.

4.   (Currently amended)   The method ~~Method~~ according to claim 1, wherein ~~characterized in that~~ the wheel rim geometry detail is the shadow border line of the rim edge contour.

5.   (Currently amended)   The method ~~Method~~ according to claim 4, wherein the position of the wheel rim in space is determined by ~~characterized in that~~

capturing the shadow border line ~~is captured~~ by at least one camera; ~~that~~

calculating from the shadow border line an extreme shadow border line curve ~~is calculated~~; ~~that~~

calculating from the extreme shadow border line curve an axes ~~is calculated~~ through an orthogonal projection, which axes is perpendicular to a plane spread out by the wheel rim~~, whereby the position of the wheel rim in space is determined~~.

6. (Currently amended) The method ~~Method~~ according to claim 1, wherein ~~characterized in that~~ the wheel rim contour is captured with two cameras which are directed to the wheel at different angles.

7. (Currently amended) The method ~~Method~~ according to claim 1, wherein ~~characterized in that~~ the picture of the wheel rim is used for determining an angular rotation reference point on the rim.

8. (Currently amended) The method ~~Method~~ according to claim 7, wherein ~~characterized in that~~, for determination of the rotation angle-reference point on the rim, the position of a characteristic feature on the wheel is used.

9. (Currently amended) The method ~~Method~~ according to claim 8, wherein ~~characterized in that,~~ a characteristic feature on the rim is used as a characteristic feature for determination of the rotation angle-reference point~~, a characteristic feature on the rim is used~~.

10. (Currently amended) The method ~~Method~~ according to claim 8, wherein ~~characterized in that~~, an air valve of the wheel is used as the characteristic feature for determination of the rotation angle-reference point~~, an air valve of the wheel is used~~.

11. (Currently amended)   The method ~~Method~~ according to claim 7, <u>wherein</u> ~~characterized in that~~, for segmentation of the perimeter of the rim, a pre-segmentation and a fine segmentation is carried out.

12. (Currently amended)   The method ~~Method~~ according to claim 11, <u>wherein</u> ~~characterized thereby that~~, in addition to the pre-segmentation and fine segmentation<u>,</u> a sub-pixel segmentation is carried out.

13. (Currently amended)   The method ~~Method~~ according to claim 1, ~~characterized thereby that~~ <u>wherein</u> the fitting of the image of the model body of the wheel rim geometry detail to the picture of the wheel rim geometry detail through alteration of model parameters of the model <u>includes</u> ~~is done thereby that~~, at first, an approximation of a rim edge plane, then an angle argument calculation and lastly a final torus model fitting on the final rim edge plane is carried out.

14. (Currently amended)   The method ~~Method~~ according to claim 1, <u>further comprising:</u> ~~characterized in that the~~

   <u>outputting or displaying</u> data with respect to the model parameters of the model which define the spatial position of the wheel rim when the image of the model body of the wheel rim geometry detail fits to the captured picture of the wheel rim geometry detail~~, are output or displayed~~.

15. (Currently amended)   The method ~~Method~~ according to claim 1, ~~characterized by the following steps~~ <u>further comprising</u>:

starting the picture shooting;

segmenting ~~segmentation of~~ the rim wherein a segmentation of the air vent of the motor vehicle is carried out;

segmenting ~~segmentation of~~ the rim edge in order to measure the asserted angle range of the rim edge;

reconstructing ~~reconstruction of~~ the 3-D position of the rim edge; and

displaying the results of the calculation, namely of the normal vector and of the central point of the rim edge plane and/or storing of the same for the further calculation.

16. (Currently amended) The method ~~Method~~ according to claim 15, wherein ~~characterized in that~~ the position of a characteristic feature is reconstructed while considering the outer camera parameters in order to obtain a parameter set [["]]axis of rotation[["]], that is the true axis of rotation with respect to the normal vector.

17. (Currently amended) The method ~~Method~~ according to claim 15, wherein ~~characterized in that~~, after the start of the picture shooting, it is examined at first whether the illumination is sufficient for the measurement, and that the illumination is adjusted accordingly.

18. (Currently amended) The method ~~Method~~ according to claim 15, wherein ~~characterized in that~~ the adjustment includes a larger or smaller intensity of the light for the illumination.

19. (Currently amended)   A measuring ~~Measuring~~ unit for determining the spatial position of a wheel rim with respect to a measuring device wherein

said measuring device includes at least one camera arranged with respect to the wheel rim such that the wheel rim lies in the viewing field of the camera for capturing of a picture of the wheel rim geometry detail of the wheel rim with the camera, and wherein

said measuring unit further comprises computer means configured to making available of a model that describes a model body of a localizable wheel rim geometry detail as well as the spatial position of the model body to the measuring device through model parameters, and further configured to fitting of the picture of the model body resulting from the model parameters to the picture of the rim geometry detail through changing the model parameters of the model, and tracking the changes of the model parameters of the model upon the fitting, wherein

the data related to the position of the model body of the wheel rim geometry detail reflect the spatial position of the wheel rim geometry detail and, thereby, of the wheel rim itself, when the image resulting from the model parameters of the model body of the wheel rim geometry detail matches to the captured picture of the wheel rim geometry detail within the asserted tolerance limits.

20. (Currently amended)   The measuring ~~Measuring~~ unit according to claim 19, wherein ~~characterized in that~~ two cameras are provided which capture the perspective picture of the wheel rim contour and are directed to the wheel under different angles.

21. (Currently amended) The measuring ~~Measuring~~ unit according to claim 19, wherein ~~characterized in that~~ each camera includes an optical sensor, an objective, an aperture setting unit and a focus setting unit, and that the mounting position of the sensors and of the objective, the aperture setting and focus setting are pre - adjusted.

22. (Currently amended) The measuring ~~Measuring~~ unit according to claim 20 wherein ~~characterized in that~~, in case of Zoom – objectives, furthermore the set focal length is pre-adjusted.

23. (Currently amended) The measuring ~~Measuring~~ unit according to claim 21, wherein ~~characterized in that~~ an output or display system, respectively, is provided for outputting or displaying, respectively, the data with respect to the model parameters, which define the spatial position of the wheel rim, when the image of the model body of the wheel rim-geometry detail fits to the captured picture of the wheel rim geometry detail.

24. (Currently amended) A computer-implemented method ~~Method~~ for the wheel alignment measurement on motor vehicles, comprising:

~~providing a method for~~ determining the spatial position of wheel rim with respect to a measuring device, that includes at least one camera, wherein the wheel rim lies in the viewing field of the camera, wherein the determining the spatial position of the wheel rim includes ~~including~~:

making available of a model that describes a model body of a localizable

wheel rim geometry detail as well as the spatial position of the model body with

respect to a measuring device in a measuring unit through model parameters,

capturing of a picture of the wheel rim geometry detail of the wheel rim with

the camera,

fitting, by the computer, of the picture of the model body resulting from the

model parameters to the picture of the rim geometry detail through changing the

model parameters of the model, and

tracking, by the computer, the changes of the model parameters of the

model upon the fitting, wherein

the data related to the position of the model body of the wheel rim geometry

detail reflect the spatial position of the wheel rim geometry detail and, thereby, of the

wheel rim itself, when the image resulting from the model parameters of the model

body of the wheel rim geometry detail matches to the captured picture of the wheel

rim geometry detail within the asserted tolerance limits, and

determining the relative positions of the measuring units for execution of the

measurements, and

expressing the measuring results of the measurements on the wheels of the

motor vehicle in terms of wheel position values taking into account the relative

positions of the measuring units, and

outputting or displaying the wheel position values.

25. (Currently amended)   The method Method according to claim 24 wherein

characterized in that the relative positions of the measuring units for the execution of

the measurements are fixed through an adjustable mounting of the measuring units on a measuring site.

26. (Currently amended) The method ~~Method~~ according to claim 25, wherein ~~characterized in that~~ the relative positions of the measuring units for execution of the measurements are determined through a reference system that is arranged between the measuring units.

27. (Currently amended) The method ~~Method~~ according to claim 24, further comprising ~~characterized through the following steps~~:

execution of the measurements of measuring the individual measuring units;

entering ~~of~~ the measuring results into a computer;

~~calculation of~~ calculating the transformation matrix from the results of the reference system measurement;

transforming the result vectors of the measuring units into the arithmetic coordinates system through offset angles and distances from the reference measuring system;

~~determination of~~ determining the wheel position values in the arithmetic coordinates system through evaluation of the position of the result vectors to each other for calculation of the corresponding wheel alignment measurement values; and

presenting ~~of~~ the results to the wheel position angle values to a display system and/or storing of the same for further use.

28. (Currently amended) A wheel ~~Wheel~~ alignment measuring system for motor vehicles, comprising:

measuring units for determining the spatial position of a wheel rim with respect to a measuring device wherein

said measuring device includes at least one camera arranged with respect to the wheel rim such that the wheel rim lies in the viewing field of the camera for capturing of a picture of the wheel rim geometry detail of the wheel rim with the camera, and wherein

said measuring units are positioned on a measuring site in such a manner that a measuring unit each is associated with one of the wheels of the motor vehicle whereby the relative positions of the measuring units are determined during the execution of the measurements,

said system further comprising computer means configured to making available of a model that describes a model body of a localizable wheel rim geometry detail as well as the spatial position of the model body to the measuring device through model parameters, and further configured to fitting of the picture of the model body resulting from the model parameters to the picture of the rim geometry detail through changing the model parameters of the model, and tracking the changes of the model parameters of the model upon the fitting, wherein

the data related to the position of the model body of the wheel rim geometry detail reflect the spatial position of the wheel rim geometry detail and, thereby, of the wheel rim itself, when the image resulting from the model parameters of the model body of the wheel rim geometry detail matches to the captured picture of the wheel rim geometry detail within the asserted tolerance limits

said computer means furthermore processing the measurement results of the measurements on the wheels of the motor vehicle to wheel position values taking into account the relative positions of the measuring units, and

an output [[-]]or display device which outputs or displays the wheel position values.

29. (Currently amended)   The wheel ~~Wheel~~ alignment measuring system according to claim 28, wherein ~~characterized in that~~ the relative positions of the measuring units for execution of the measurements are fixed through an adjustable mounting of the measuring units at a measuring site.

30. (Currently amended)   The wheel ~~Wheel~~ alignment measuring system according to claim 28, wherein ~~characterized in that~~ the relative positions of the measuring units for execution of the measurement are determined through a reference system, that is arranged on the measuring units.

31. (Currently amended)   The wheel ~~Wheel~~ alignment measuring system according to claim 28, wherein ~~characterized in that~~, upon combined assembly of two cameras in a measuring unit for a stereo-measuring system, the cameras are calibrated with respect to the coordinates system of the measuring unit.